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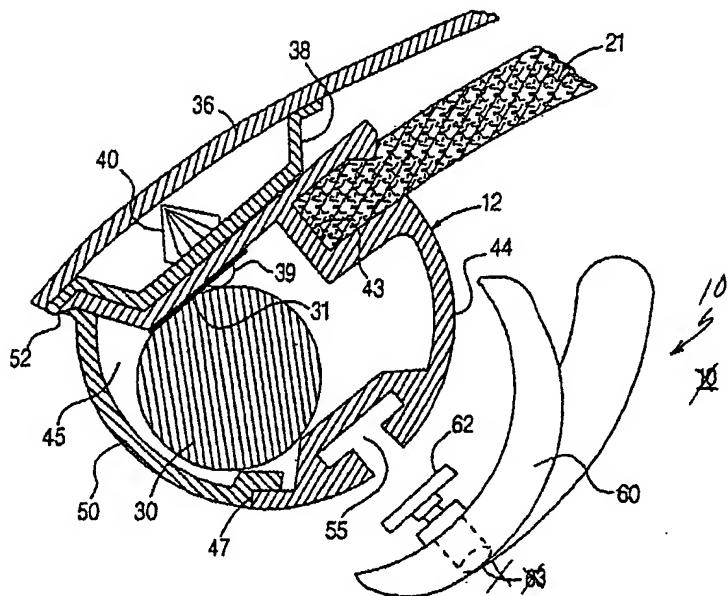
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[Continued on next page]

(54) Title: EXTRUSION FOR THE SIDERAIL OF A VEHICLE WITH HEAD IMPACT COUNTERMEASURE AND SUPPORT FOR COMPONENTS



(57) Abstract: An extrusion (12) made from metal or plastic extends along the siderail of a vehicle and acts as a head impact countermeasure (12), and in the preferred embodiment as a platform for the attachment of any of a variety of siderail attachments, such as grab handles, coat hooks, visor tracks (60, 75), etc. The components can be attached in a way which permits them to slide to the appropriate position and be locked into place. The hollow interior (45) of the extrusion (12) can be used to house additional safety components, such as a side air bag (30).

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**EXTRUSION FOR THE SIDERAIL OF A VEHICLE
WITH HEAD IMPACT COUNTERMEASURE AND
SUPPORT FOR COMPONENTS**

Cross-reference to related patent applications, if any: None.

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates generally to the field of vehicle occupant protection systems and more particularly to systems used to absorb energy and to decelerate portions of an occupant's body in the event of an accident/impact. Still more specifically, the invention relates to an extrusion attached in the vicinity of the vehicle siderails which provides energy absorbing capability, as well as a platform for the attachment of a variety of siderail components and visors. In its most preferred embodiment, each extrusion allows siderail components to slide along its length and to be locked in the desired location. Furthermore, the extrusion can be hollow to receive additional components, such as side impact air bags.

DESCRIPTION OF THE PRIOR ART

[0002] New standards in the United States (e.g., FMVSS 201) mandate that vehicle components must be able to absorb energy to decelerate an occupant in the case of an accident/impact. It has been known for some time that the siderails, as well as other vehicle components can provide assistance in reducing injuries from side impacts, roll-over accidents, and the like. Several prior art references discuss siderail protection elements. For example, Kalazny, in U.S. Patent No. 6,189,930, issued February 20, 2001, and entitled "Joint Between Side Rail and Cross Member in a Vehicle Frame Assembly", a joint between a siderail and a cross member includes separate webs extending from

grooves at the upper and lower portions of the siderail. A general representation of the prior art is shown in FIGURE 1 of U.S. Patent No. 6,189,930.

[0003] Nakajima et al., in U.S. Patent No. 6,173,990, issued January 16, 2001, and entitled "Interior Equipment Mounting Structure for a Vehicle Incorporating Head-Protecting Air Bag Body" describes the mounting of a side impact air bag adjacent to the siderail of a vehicle, the structure being particularly designed for the plastic deformation of a component without interference with other interior equipment, such as sun visors.

[0004] An "Energy Absorbing Automotive Vehicle Body Structure" is described in Patel et al., U.S. Patent No. 5,725,271, issued March 10, 1998. In this device, a structural member (such as a siderail) of a vehicle serves as the mounting structure for trim components which include spring-like serpentine elements to assist in energy absorption. The trim members are separated from the structural members using such serpentine elements. A plurality of serpentine elements may be used for particular trim components.

[0005] A different energy absorbing system is shown in U.S. Patent No. 5,988,678, issued November 23, 1999, to Nakamura et al., and entitled "Structure for Mounting of Internal Part for Vehicle." In this device, especially that shown in FIGURES 2 and 3, an energy absorbing pad is mounted to the siderail and between the siderail and the vehicle headliner. The patent does not show any type of extrusion structure to which individual vehicle components can be added.

[0006] A still further occupant protection system is shown in United States Patent No. 5,575,500, issued November 19, 1996, to Mimura et al., and entitled "Occupant Protecting Structures of Vehicle Body Upper Portions". In this device, the pillar components include energy absorbing devices located between the pillar inner panel and pillar outer panels as shown in FIGURE 1. A variety of different embodiments are also discussed in this patent.

[0007] U.S. Patent No. 6,145,908, issued November 14, 2000, to Deb et al., and entitled "Energy Absorbing Continuously Compliant Swept Arch

for Interior Trim" describes an energy absorbing system located, for example, on the "A" pillar of a vehicle.

[0008] Other vehicle frame and energy management systems are shown in U.S. Patent No. 6,168,204, issued January 2, 2001, to Beckman for "Vehicle Frame Assembly Having Integral Support Structures"; U.S. Patent No. 5,855,394, issued January 5, 1999, to Horton et al., for "Motor Vehicle Frame Assembly and Method of Forming the Same"; U.S. Patent No. 5,820,204, issued October 13, 1998, to Masuda et al., for "Body Structure for a Motor Vehicle"; and U.S. Patent No. 5,605,353, issued February 25, 1997, to Moss et al., for "Vehicle Chassis With Energy Management."

[0009] While these different solutions have been proposed in the past, many of them are non-compliant with new federal regulations for head impact. Moreover, there has been a continuing, and as of yet unresolved, conflict between providing sufficient energy absorption in the siderail area and providing sufficient room in the vehicle interior, especially head room. The greater the amount of impact absorption material (such as urethane foam or the like), the more space within the vehicle is occupied by such a device. The less material used, the less the impact countermeasure.

[0010] In addition to the aforementioned issues involving occupant protection, another need in vehicle design is the proper location and installation of various vehicle accessories, such as grab handles, visors, coat hooks, siderail lighting, as well as a wide variety of new overhead components being devised by vehicle manufacturers for educational, entertainment or informational purposes. Such uses include, but certainly are not limited to, ports for computer connections, navigation systems and the like. While it is most desirable that these features be added at the location where the overhead system is assembled, with some vehicle designs, it may be necessary to install them at the final assembly plant. Such assembly can be time consuming and therefore costly. Moreover, most of such accessories can only be located at a specific location, i.e., where holes are provided for the attachment to the sheet metal of the vehicle or the siderails.

[0011] A head impact countermeasure system which would occupy little space, provide sufficient countermeasure to achieve compliance with regulations and which also could optionally have the additional feature of being able to support siderail components would be a substantial advance in this art.

FEATURES AND SUMMARY OF THE INVENTION

[0012] A primary feature of the present invention is to provide a siderail head impact countermeasure which is compact and readily adaptable to a wide variety of vehicle designs.

[0013] Another feature of the present invention is to provide a siderail head impact countermeasure which can serve as a platform for the mounting of a variety of vehicle accessories.

[0014] A different feature of the present invention is to provide a siderail head impact countermeasure which can store and permit deployment of a side air bag.

[0015] Yet a further feature of the present invention is to provide a head impact countermeasure extrusion which can be attached to the siderail or the front and/or back headers, and which additionally can serve as a track for movable accessories, such as sun visors.

[0016] A different feature of the present invention is to provide an extrusion for impact countermeasure which may be made from a variety of different materials.

[0017] A related but still further feature of the present invention is to provide a head impact countermeasure for vehicles which may be easily matched in appearance to the remaining components of the interior of a vehicle.

[0018] Another feature of the present invention is to provide a head impact countermeasure for vehicles which allows an air bag to be easily installed in a roomy location. Furthermore, the countermeasure protects the air bag during installation.

[0019] How these and other features of the invention are accomplished, individually, collective, or in various subcombinations, will be

described in the following detailed description of the preferred and alternate embodiments, taken in conjunction with the FIGURES. Generally, however, they are accomplished in the preferred embodiment by a siderail head impact countermeasure which includes a hollow extrusion attached to the vehicle siderail. The material for the extrusion is selected from metals, metal alloys or plastics which have certain deformation characteristics which will be discussed in detail below. The extrusion may furthermore be used as part of the support for the vehicle headliner or other overhead components, and preferably, is used as a platform for the attachment of vehicle accessories, such as grab handles, coat hooks, lights, visors, etc. The accessories may be mounted through the countermeasure to the vehicle sheet metal or siderails, or they may be removably or permanently attached to the countermeasure itself. In an especially preferred embodiment of the invention, the features are accomplished using a hollow countermeasure which also receives a side air bag which is deployed through a portion of the countermeasure at the time of an accident/impact. In one illustrated embodiment, a slot is formed along the countermeasure and a flap closes the slot. The air bag pushes the flap out of the way to permit deployment of the air bag when needed.

[0020] The countermeasure can also serve as a support for or a portion of a track system for a sun visor, such as a sun-tracking visor which is moved from the windshield area to the side windows when needed to protect occupants from direct sunlight.

[0021] Other ways in which the above-referenced features of the invention are accomplished will appear to those skilled in the art after they have read the following detailed description of the preferred embodiment and have reviewed the FIGURES. Such other ways are deemed to fall within the scope of the present invention if they fall within the scope of the claims which follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] In the following FIGURES, like reference numerals will be used to indicate like components, and

[0023] FIGURE 1 is an exploded schematic illustration of siderail extrusions according to the present invention, and a preferred feature, i.e., the inclusion of an air bag and air bag inflator system within the countermeasures;

[0024] FIGURE 2 is a side sectional view taken through one of the countermeasure and illustrating the attachment of the countermeasure to the vehicle siderail, the air bag, the use of the countermeasure as a headliner support, a releasable flap system for air bag deployment, and one preferred technique for attaching vehicle accessories to the countermeasure; and

[0025] FIGURE 3 is a view similar to FIGURE 1 but showing a different countermeasure configuration, without an air bag and with a different system for attaching a vehicle accessory.

DETAILED DESCRIPTION OF THE PREFERRED
AND ALTERNATE EMBODIMENTS OF THE PRESENT INVENTION

[0026] Before beginning the detailed description of the preferred and alternate embodiments of the present invention, several general comments can be made about the applicability and the scope thereof.

[0027] First, the particular materials from which the countermeasure of the present invention is constructed can vary substantially depending upon the particular cross sectional configuration of the countermeasure and the wall thicknesses thereof, as well as the properties of the materials employed. Generally, metals and metal alloys are the preferred material for construction, and generally a wall thickness between .5 mm and 5.0 mm is used. It will be appreciated by those skilled in the art of occupant protection, and those familiar with the regulations applicable thereto, that the countermeasure must be able to deform sufficiently to absorb an impact which is simulated in testing by propelling a spherical element at the countermeasure, the element having a surface simulating that of human skin. As the description continues, it will be apparent that the countermeasures of the present invention are preferably hollow and they will deform in relation to the severity of the accident/impact. The countermeasure should not fully collapse to the point that material used for

its construction meets the siderails, providing no further countermeasure potential.

[0028] The preferred materials are metal or alloys, as indicated above, but plastics could also be used if they possess the deformation characteristics described above. The preferred material for use in the invention is aluminum having a wall thickness, depending upon the specific cross section, of between about 0.5 and 5.0 mm.

[0029] Two different configurations are shown for the siderail head impact countermeasures of the present invention in FIGURES 2 and 3. In FIGURE 2, the countermeasure is secured to the siderail and assists in the support of the vehicle headliner. Furthermore, the countermeasure has a hollow interior adapted to receive a side air bag and a slot extending along its length to permit deployment of the air bag. The slot is closed by a flap, preferably of a different material than the countermeasure, the flap being pushed out of the way at the time of air bag deployment. That example also illustrates one technique for attaching vehicle accessories to the countermeasure.

[0030] The second embodiment of the invention shows a countermeasure which is not employed with a side air bag, and in which the vehicle accessory extends through an opening in the countermeasure, and a fastener connects the accessory through the accessory, the countermeasure and into a receiver located within the siderail.

[0031] These particular illustrations point out the wide variety of designs which fall within the scope of the present invention and the variety of ways in which accessories can be attached. While both embodiments show that the countermeasure is used as a platform for the attachment of accessories, that is not required for the present invention, and accessories can be attached in more conventional ways without departing from the spirit and scope of this invention.

[0032] Another aspect of the present invention is schematically illustrated herein, i.e., the use of the countermeasure interior as a continuation of a track for vehicle sun visors, such as those which are moved to track the

sun. For example, the visors can be located, as shown, in front of the driver and front seat passenger, and slide along the illustrated track to the side window position when needed. In lieu of having the track continue within the countermeasure itself, the track for such a visor could be simply attached to the exterior of the countermeasure.

[0033] Finally, one particular vehicle roof system is shown including front and rear headers, two cross bows, and three headliner inserts. The number of cross bows, the configuration of the headliner, and any forming of the headliner which may be needed or desired for a particular vehicle can be varied widely and need not be shown in the present FIGURES for purposes of illustrating the invention. Still more specifically, the illustrated embodiment shows a center rail system for the mounting of vehicle accessories such as a compass, sunglass holder, overhead lighting, entertainment, education or informational devices, and the like. Again, the particular design of any such rail system can vary widely without impacting the scope of the present invention, e.g., the rail(s) could be offset from the longitudinal center line of the vehicle.

[0034] Proceeding now to a description of the preferred and alternate embodiments, FIGURE 1 is an exploded view showing certain components, with other components removed for purposes of ease of explanation. System 10 includes a pair of hollow siderail head impact countermeasures 12 extending generally between a front header 14 and a rear header 16 of a vehicle. The illustrated roof system also includes a pair of cross bows 18.

[0035] The headliner of the illustrated embodiment is comprised of a forward section 20, a middle section 21, and a rear section 22, each of which includes various openings and apertures for attachments, as will be readily appreciated by those skilled in the art. In addition, system 10 is shown to include a center rail system 23, such as that described at the beginning section of this portion of the specification: The rail system attachments fit within the openings of the front portion 20 and mid portion 21 of the headliner. It will be appreciated from the description thus far that the countermeasures 12 assist in

supporting the headliner, a feature which will become more apparent in connection with the descriptions of FIGURES 2 and 3.

[0036] FIGURE 1 also illustrates a pair of visors 25 mounted on tracks 27, the tracks being coupled to the forward ends of countermeasures 12 to provide a continuous passageway for movement of the visors as described hereinabove. Alternately, the tracks 27 could be attached to the countermeasures 12 without departing from the invention's intended scope.

[0037] Finally, FIGURE 1 shows an air bag 30 rolled into an elongate, generally cylindrical form to be inserted into each countermeasures 12 as illustrated by the coupling line. Moreover, an inflator 32 for the air bag 30 is shown in this FIGURE. The inflator 32 could be installed at other locations, such as in the A or B pillars of the vehicle.

[0038] Countermeasure 12 is shown in considerably greater detail in FIGURE 2. This FIGURE also shows certain additional components including the roof sheet metal 36 and a vehicle siderail 38 which, in and of themselves, are conventional. Countermeasure 12 is attached to siderail 38 using a fastener 39 extending into a fastener clip 40. A wide variety of techniques can be used for such attachment, including welding, riveting, the use of threaded fasteners, the use of adhesives and the like. FIGURE 2 also shows the middle section 21 of the headliner (which can be selected from any of those known in the art including those made from foam, fibers, mixtures of foam and fibers, etc.). Air bag 30 is also shown and is located within the hollow interior 45 of extrusion 12. Air bag 30 could be attached to the countermeasure 12, such as by strip 31 held by fastener 39. Extrusion 12 includes a side wall which initially forms a slot 43 for receiving an edge of headliner portion 21, a generally rounded surface 44 facing the vehicle interior, and a slot 47 located at its lower portion. In the illustrated embodiment, the slot is closed by a flap 50 (preferably formed of a polymer or an elastomer or mixtures thereof), which flap is coupled to countermeasure 12 by a live hinge 52. The hinge could be a multi-part hinge, e.g., one having two parts. The flap 50, because it is made from a less rigid

material than the wall of countermeasure 12, will readily push out of the way of air bag 30 when it is deployed along the side of the vehicle.

[0039] One technique for coupling vehicle accessories to a countermeasure is also illustrated in FIGURE 2. The accessory chosen for purposes of illustration only is a coat hook 60 which is coupled to a "T-shaped" receiving opening 55 in surface 44 of countermeasure 12. A connector 62 extends from the back side of coat hook 60 and may be moved along the length of countermeasure 12 until the desired location is reached. When the appropriate location is determined, the connector 62 may be secured by rotation to extend the length thereof and form a frictional coupling within receiver 55. Other attachment techniques will appear to those skilled in the art and are within the invention's intended scope. Among these are the use of adhesives, threaded fasteners, detachable fasteners (such as VELCRO® hook and loop fastener), etc. Other accessories can be attached above or in combination with hook 60, e.g., grab handles, lights, visors, infotainment accessories, vents, power couplings, computer ports, consoles, trim garnish, nets, receptacles, etc.

[0040] FIGURE 3 illustrates a different shape for a countermeasure 65 suitably attached to siderail 38 as shown in the previous FIGURE. In this case, the countermeasure includes a slot 68 for receiving the middle section 21 of the headliner, and a flat surface 69 facing toward the interior of the vehicle. Countermeasure 65 also includes a hollow interior 66 for the reasons discussed previously.

[0041] In this embodiment, a coat hook 75 is attached to the siderail 38 using a threaded fastener 77. A collar 76 extends from the back side of coat hanger 75 and is open to receive the fastener 77 therethrough.

[0042] As can be readily appreciated from these two FIGURES, the attachment may be made directly to the vehicle siderail, other fixed structures within the vehicle, or, as illustrated in FIGURE 2, to the countermeasure itself.

[0043] While the present invention has been described in connection with a preferred and an illustrated alternate embodiments, the invention is not to

be limited in terms of materials, dimensions, the use of accessories, air bags, and the like, but is to be limited solely by the scope of the claims which follow.

WHAT IS CLAIMED IS:

- 1 1. An impact countermeasure system for a vehicle having a roof with
2 a perimeter and a headliner, the system comprising:
3 at least one generally hollow, elongate element extending
4 horizontally in a vehicle in the vicinity of the roof perimeter, the at least one
5 element being made from a material and having a wall thickness selected to
6 deform in the event of contact by a vehicle occupant's head during an accident
7 or impact, wherein a portion of the element is configured to assist in supporting
8 the headliner; and
9 a vehicle accessory removably attached to the element.
- 1 2. The countermeasure system of claim 1 wherein the at least one
2 element is constructed of a material selected from the group consisting of
3 metals, metal alloys, polymers, and elastomers.
- 1 3. The countermeasure system of claim 1 wherein the at least one
2 element has a wall thickness of between about 0.5 mm and 5 mm.
- 1 4. The countermeasure system of claim 1 wherein the at least one
2 element has a generally circular cross-section.
- 1 5. The countermeasure system of claim 1 wherein the at least one
2 vehicle accessory is fastened to the vehicle through the element.
- 1 6. The countermeasure system of claim 1 wherein the vehicle
2 accessory is attachable to the element at a preselected location along a length
3 of the element.
- 1 7. The countermeasure system of claim 1 wherein an air bag is
2 located within the at least one element.
- 1 8. The countermeasure system of claim 9 wherein an air bag inflator is
2 also located within the at least one element.

1 9. The countermeasure system of claim 9 wherein the at least one
2 element includes a slot along a length of the element through which the air bag
3 is deployed upon an accident or impact.

1 10. The countermeasure system of claim 11 wherein the slot is closed
2 by a flap prior to deployment of the air bag and the flap opens upon air bag
3 deployment.

1 11. The countermeasure system of claim 11 wherein the flap is a
2 hinged plastic flap.

1 12. An occupant protection system for a vehicle, the vehicle including
2 siderails, a headliner and a vehicle roof, the protection system comprising:
3 at least one head impact countermeasure extending along the
4 siderails for a length sufficient to assist in protecting occupants seated on both
5 sides of the vehicle and in at least two seat rows;
6 the at least one countermeasure being hollow and having an interior
7 defined by a wall;
8 the volume of the interior and the thickness of the wall being
9 selected to allow the at least one head impact countermeasure to deform when
10 struck by the head of one of the occupants during an accident or impact
11 wherein a track for a movable sun visor is coupled to the at least one head
12 impact countermeasure.

1 13. The occupant protection system of claim 14 wherein a portion of
2 the at least one head impact countermeasure assists in supporting the vehicle
3 headliner.

1 14. The occupant protection system of claim 15 wherein a track for a
2 movable sun visor extends into the interior of the at least one head impact
3 countermeasure.

1 15. The occupant protection system of claim 14 wherein an air bag is
2 located within the at least one head impact countermeasure.

1 16. The occupant protection system of claim 18 wherein a slot extends
2 along the at least one head impact countermeasure for deployment of the air
3 bag.

1 17. The occupant protection system of claim 19 wherein the slot is
2 closed by a material flap prior to deployment of the air bag and the flap opens
3 upon deployment of the air bag.

1 18. The occupant protection system of claim 20 wherein the flap is a
2 hinged plastic flap.

1 19. The occupant protection system of Claim 14 wherein the wall at
2 least partially forms the track.

1 20. The occupant protection system of Claim 22 wherein the track is
2 integrally formed as part of a single unitary body with the wall.

1 21. The occupant protection system of Claim 14 wherein the wall has a
2 first surface configured to be exposed to an interior of the vehicle.

1 22. The occupant protection system of Claim 24 including a flap having
2 a terminal end in engagement with and supported by the wall, wherein the
3 terminal end has a second surface substantially flush with the first surface.

1 23. The countermeasure system of Claim 1 wherein the at least one
2 element includes an elongate track configured to support the accessory at one
3 of a plurality of positions along the track.

1 24. The countermeasure system of Claim 26 wherein the at least one
2 element includes a wall forming an interior, wherein the wall at least partially
3 forms the track.

1 25. The countermeasure system of Claim 27 wherein the track is
2 integrally formed as part of a single unitary body with the wall.

1 26. The countermeasure system of Claim 26 wherein the at least one
2 element includes a wall forming an interior and wherein the wall has a first
3 surface configured to be exposed to a vehicle interior.

1 27. The countermeasure system of Claim 29 including a flap having a
2 terminal end supported by and in engagement with the wall, wherein the
3 terminal end has a second surface substantially flush with the first surface.

1 28. The countermeasure system of Claim 1 wherein the accessory is
2 attached to the at least one element without a fastener.

1 29. The countermeasure system of Claim 1 including a first mechanism
2 configured to attach the element to a support structure of the vehicle and a
3 second mechanism attaching the accessory to the element.

1 30. The countermeasure system of Claim 1 wherein the at least one
2 element is configured to be coupled to a support structure of the vehicle and
3 wherein the system includes an air bag disposed within the at least one element
4 and sandwiched between the accessory and the support structure.

1 31. The countermeasure system of Claim 1 wherein the at least one
2 element is configured to be coupled to a support structure of the vehicle and
3 wherein the at least one element is configured to extend between an air bag
4 within the element and the support structure.

1 32. The countermeasure system of Claim 1 wherein the at least one
2 element has a surface exposed to an interior of the vehicle.

1 33. The countermeasure system of Claim 1 including an air bag within
2 the at least one element, wherein the at least one element has a surface

3 exposed to a vehicle interior while the air bag is concealed from the vehicle
4 interior.

1 34. The countermeasure system of Claim 1 wherein the at least one
2 element includes an opening configured to receive an end portion of the
3 headliner.

4 35. An impact countermeasure system for a vehicle having a support
5 structure proximate an interior of the vehicle along a roof perimeter, the system
6 comprising:

7 an elongate element forming an interior and configured to extend
8 horizontally in the vehicle in a vicinity of the roof perimeter, wherein the element
9 is made from a material and has a wall with a thickness selected such that the
10 wall deforms in the event of contact by a vehicle occupant's head during an
11 accident or impact; and

12 a track coupled to the element, wherein the track is configured to
13 support a vehicle accessory in one of a plurality of positions along the track.

14 36. The countermeasure system of Claim 38 wherein the element
15 includes a wall forming the interior and wherein the wall at least partially forms
16 the track.

17 37. The countermeasure system of Claim 39 wherein the track is
18 integrally formed as part of a single unitary body with the wall.

19 38. The countermeasure system of Claim 38 wherein the element
20 includes a wall forming the interior, wherein the wall has a first surface
21 configured to be exposed to the vehicle interior.

22 39. The countermeasure system of Claim 41 including a flap having a
23 terminal end in engagement with and supported by the wall, wherein the
24 terminal end has a second surface substantially flush with the first surface.

25 40. An impact countermeasure system for a vehicle having a vehicle
26 interior and a support structure extending at least partially along a roof perimeter
27 in the vehicle interior, the system comprising:

28 an elongate element having a wall extending along an element
29 interior, wherein the element is configured to extend horizontally in the vehicle
30 in a vicinity of the roof perimeter, wherein the wall is made from a material and
31 has a wall thickness selected so as to deform in the event of contact by a
32 vehicle occupant's head during an accident or impact;

33 a vehicle accessory;

34 a first mechanism configured to attach the element to the support
35 structure of the vehicle; and

36 a second mechanism attaching the accessory to the element.

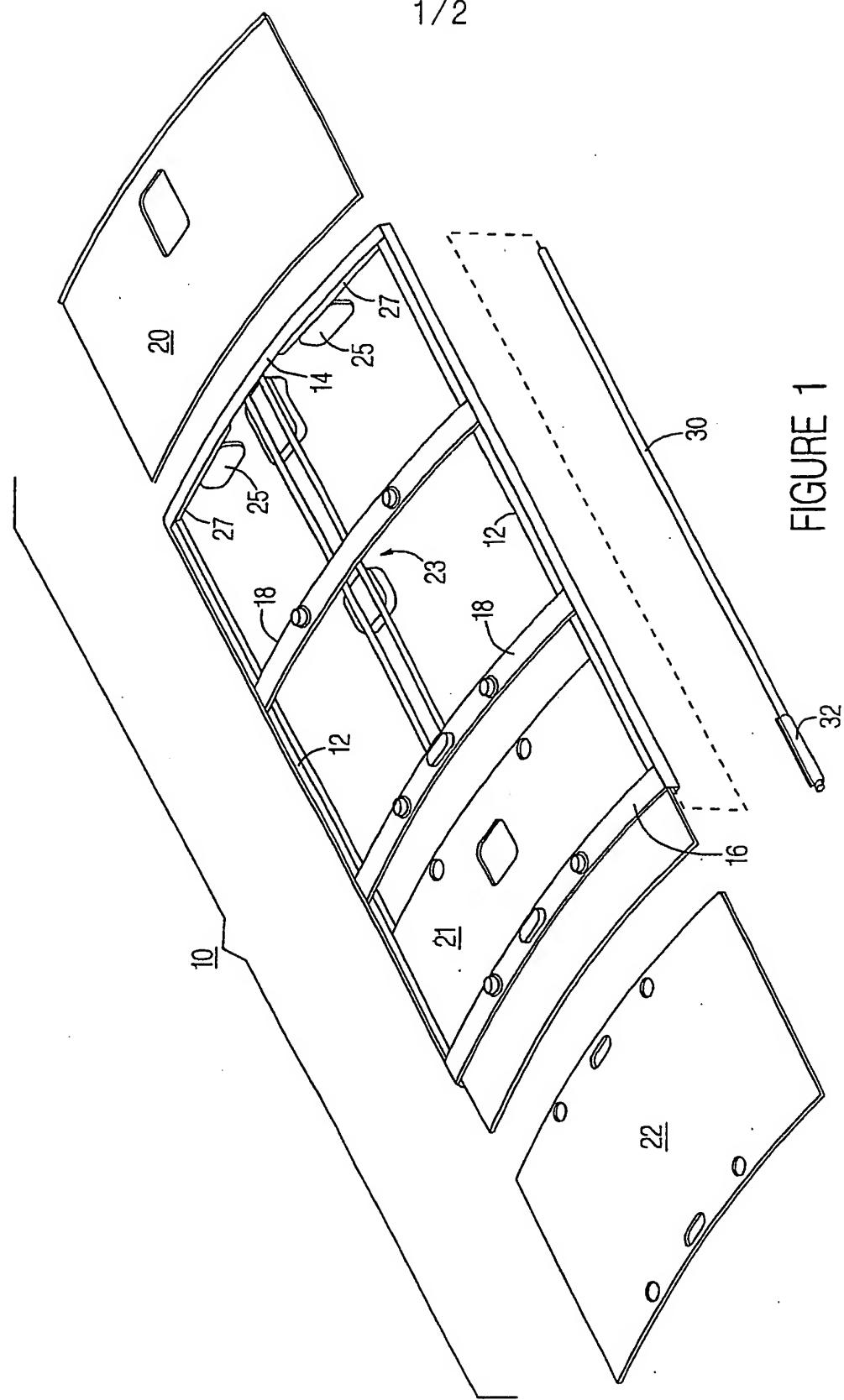
37 41. The countermeasure system of Claim 43 including an air bag
38 disposed within the element interior and sandwiched between the accessory and
39 the support structure.

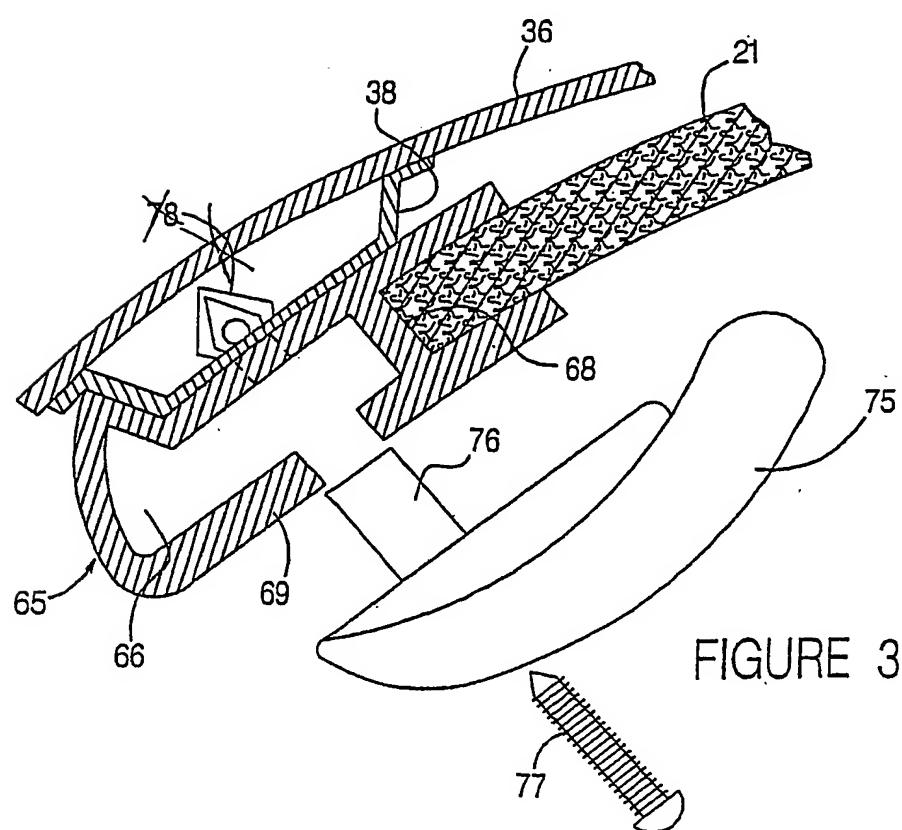
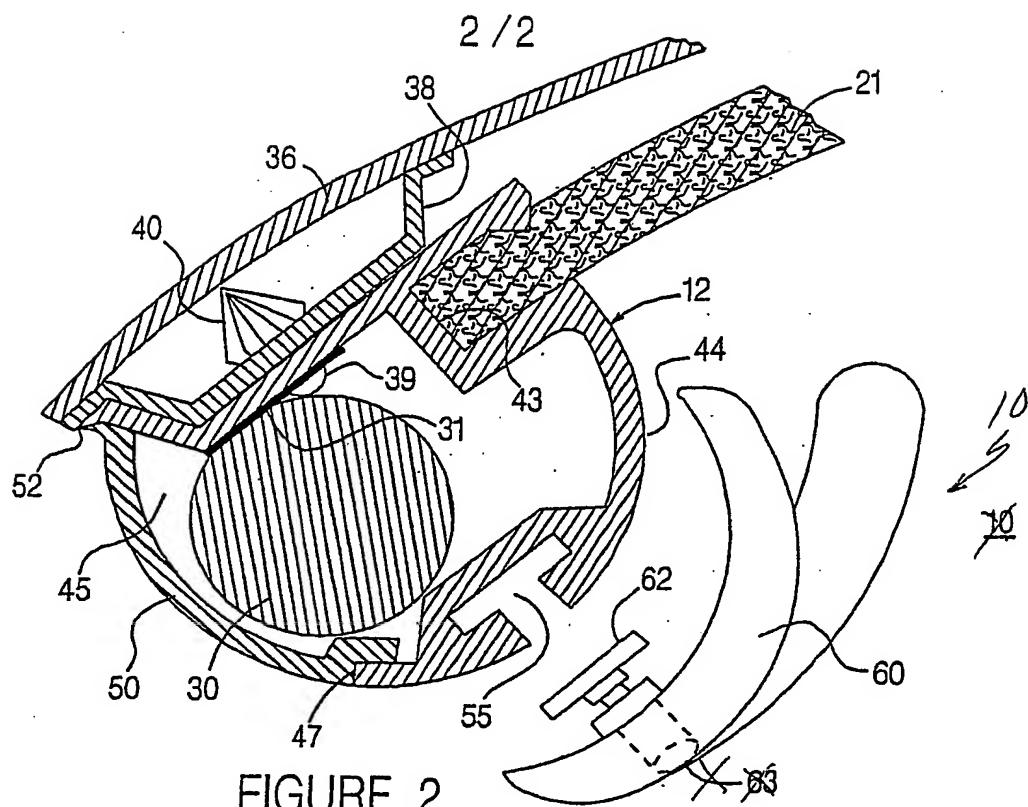
40 42. The countermeasure system of Claim 43 wherein the element is
41 configured to extend between an air bag within the element interior and the
42 support structure.

43 43. The countermeasure system of Claim 43 wherein the element has a
44 surface exposed to the vehicle interior.

45 44. The countermeasure system of Claim 43 including an air bag within
46 the element interior, wherein the element has a surface exposed to the vehicle
47 interior while the air bag is concealed from the vehicle interior.

1/2





INTERNATIONAL SEARCH REPORT

International application No

PCT/US 03/11589

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7	B60R7/10	B60N3/00	B60N3/02	B60R21/20	B60R21/16
	B60R21/04	B60R13/02	B60R11/00		

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60R B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 852 191 A (TOYOTA MOTOR CO LTD) 8 July 1998 (1998-07-08) the whole document ---	40
A	DE 198 12 737 A (AUTOLIV DEV) 27 May 1999 (1999-05-27) the whole document ---	1, 12, 35, 40
A	DE 198 06 767 A (VOLKSWAGENWERK AG) 19 August 1999 (1999-08-19) the whole document ---	1, 12, 35, 40
A	DE 23 59 718 A (RICHTER EBERHARD) 5 June 1975 (1975-06-05) the whole document ---	12 -/-



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

- °A° document defining the general state of the art which is not considered to be of particular relevance
- °E° earlier document but published on or after the International filing date
- °L° document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- °O° document referring to an oral disclosure, use, exhibition or other means
- °P° document published prior to the International filing date but later than the priority date claimed

- °T° later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- °X° document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- °Y° document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- °&° document member of the same patent family

Date of the actual completion of the International search

Date of mailing of the International search report

5 August 2003

19/08/2003

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US 03/11589

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 755 457 A (SPECHT MARTIN) 26 May 1998 (1998-05-26) the whole document ----	
A	US 6 106 006 A (SUTHERLAND DANIEL R ET AL) 22 August 2000 (2000-08-22) ----	
A	EP 1 013 505 A (PRINCE TECHNOLOGY CORP) 28 June 2000 (2000-06-28) ----	
A	WO 01 44027 A (LEAR CORP ;TIESLER JOHN M (US)) 21 June 2001 (2001-06-21) ----	
A	EP 0 800 956 A (TOYOTA MOTOR CO LTD) 15 October 1997 (1997-10-15) ----	
A	EP 0 520 167 A (DAIMLER BENZ AG) 30 December 1992 (1992-12-30) ----	

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.:

8,9,10,11,13,14,15,16,17,18,19,20,21,22,24,26,36,37,38,39,41,42,43,44,

In view of the large number and also the wording of the claims presently on file, which render it difficult, if not impossible, to determine the matter for which protection is sought, the present application fails to comply with the clarity and conciseness requirements of Article 6 PCT (see also Rule 6.1(a) PCT) to such an extent that a meaningful search is impossible. Consequently, the search has been carried out for those parts of the application which do appear to be clear (and concise), namely claims 1,2,3,4,5,6,7,12,23,25,27,28,29,30,31,32,33,34,35 and 40.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/11589

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US 03/11589

Patent document cited in search report	Publication date	Patent family member(s)			Publication date
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